



**Plant extracts and essential oils in seed treatment:
production of healthy tomato transplants**

Mbega, E.R.; Mabagala, R.B.; Wulff, Ednar Gadelha; Mortensen, Carmen Nieves

Publication date:
2011

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Mbega, E. R., Mabagala, R. B., Wulff, E. G., & Mortensen, C. N. (Ed.) (2011). Plant extracts and essential oils in seed treatment: production of healthy tomato transplants. Danish Seed Health Centre for Developing Countries, University of Copenhagen.



« Best Plant Essential Oils »

Eucalyptus globules (Eucalyptus), *Rosmarinus officinalis* (Rosemary) and *Melaleuca viridiflora* (Niaouli) at 2% (v/v) inhibited the growth of *Xanthomonas* and were the most efficient in controlling BLS

« Best Plant Extracts »

Aloe vera (Aloe), *Coffea arabica* (Processed coffee), *Glabra urelensis* (Liquorice), *Yucca schidigera* (Yucca)

«Application of Plant Extracts and Essential Oils as Seed Bactericides»

Could be advantageous to small scale farmers in the production of healthy and robust tomato transplants:

- Easily available
- Environmentally friendly
- Biodegradable
- Low toxicity to animals
- No phytotoxic effects (germination, vigour, plants weight)

The leaflet was compiled from outputs of the Danida Enreca project Life-731 at the time of writing.

Compiled by:

E. R. Mbega, R.B. Mabagala (AfSHC)

E.G. Wulff, C.N. Mortensen (DSHC)

Denmark:

Danish Seed Health Centre (DSHC)
Faculty of Life Sciences, University of Copenhagen
Højbakkegård Allé 9, 2630 Tåstrup, Denmark
Phone: +45 35 3333186; E-mail: cnm@life.ku.dk;
www.dshc.life.ku.dk

Tanzania:

African Seed Health Centre (ASHC)
Sokoine University of Agriculture
P.O. Box 3005, Morogoro, Tanzania
Phone: +255 232 600 573; Fax: +255 232 600 574
E-mail: rbm@afshc.or.tz; www.afshc.or.tz



PLANT EXTRACTS AND ESSENTIAL OILS IN SEED TREATMENT



PRODUCTION OF HEALTHY TOMATO TRANSPLANTS



BIOASSAYS

Bacterial leaf spot (BLS)

A disease caused by different seed-borne pathogenic xanthomonads: *Xanthomonas euvesicatoria*, *X. vesicatoria*, *X. perforans* and *X. gardneri* is a serious constraint of tomato (*Lycopersicon esculentum* Mill) production causing significant losses in yield and quality.

The efficacy of aqueous extracts obtained from 84 plant species and 11 essential oils to control BLS was evaluated with infected tomato seed under laboratory and greenhouse conditions.

Tomato seeds of the cv. Tanya from Tanzania served as a model for the studies. Seed samples infected with a strain of *X. perforans* NCPB 4321 were soaked overnight in 10% (v/v) aqueous plant extracts and essential oils at 2% (v/v) concentration.



BLS symptoms on tomato leaves and fruits



Preparation of plant extracts:

Boil 2 g of air-dry chopped plant parts (bark, leaves, roots, flowers, and seeds) in 20 ml of sterile distilled water



Filter the plant extract suspensions using two-layered cheese-cloth



Adjust volume to 20ml with water



Keep plant extracts in 30ml clean tubes with screw caps



Autoclave plant extracts at 121 °C for 15 min and kept at 4 °C until use

Seed treatments:



Prepare water suspensions of plant extracts (10%) or essential oils (2%)



Add 20 seeds/ml of treatment



Incubate overnight at room temperature and if possible under shaking



Air-dry the seeds onto absorbent paper and keep seed refrigerated until use



Production of healthy tomato transplants in the greenhouse

Evaluation of efficacy of seed treatments

In vitro tests:

Plate 50µl of seed extract or oil suspension onto agar substrate by streaking; incubate at 28 °C for 1-2 days

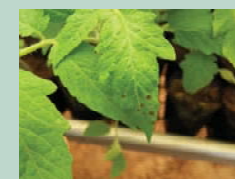


BLS colonies on mTB agar indicate: **no** inhibition of the pathogen by the seed treatment



In planta tests:

Plant seeds in soil (14-21d) under moist conditions at 28 °C: higher number of healthy transplants from best seed treatments with 75 -100% reductions of BLS disease incidence



Efficacy of seed treatment: low number of BLS symptoms



No efficacy of seed treatment: tomato leaves with



No efficacy of seed treatment (left and right: high incidence of BLS); good control of BLS